

REMARKS

Reconsideration and allowance of this application, as amended, are respectfully requested. This replacement amendment includes appropriate mark ups in the replacement specification paragraph.

The specification has been amended at page 9. For the Examiner's information, the following paragraph shows the changes made to the substituted paragraph submitted in this amendment. No new matter has been added.

Correspondingly, as comparative example, the under-mentioned Catalysts ~~E₁—E₄~~ C1-C4 were prepared. That is, Catalyst C1 is a proton type β zeolite which is obtained by burning a commercially available NH_4 type β zeolite ($\text{SiO}_2/\text{Al}_2\text{O}_3$ molar ratio: 75) at 450°C for 5 hours. Catalyst C2 is a proton type ~~β zeolite~~ mordenite which is obtained by burning a commercially available NH_4 type β mordenite ($\text{SiO}_2/\text{Al}_2\text{O}_3$ molar ratio: 20) at 450°C for 5 hours. Catalyst C3 is a proton type ZSM-5 which is obtained by burning NH_4 type ZSM-5 ($\text{SiO}_2/\text{Al}_2\text{O}_3$ molar ratio: 27) on the market at 450°C for 5 hours. Furthermore, Catalyst C4 is made of β zeolite carrying Co which is obtained by mixing 100g of ion-exchanged water with 1.3 g of cobalt acetate tetrahydrate, dispersing 10g of proton type β zeolite ($\text{SiO}_2/\text{Al}_2\text{O}_3$ molar ratio: 27) obtained by the above-mentioned method of Catalyst 1 into the solution, agitating at 60°C for 12 hours, and then, after filtering, wet-cleaning and drying at 110°C , burning at 500°C for 3 hours in the atmosphere. In addition, the amount of Co in the ~~Catalyst 4~~ Catalyst C4 was 2.7 weight % in metal to the whole catalyst.

Claims 1-4 stand rejected under 35 USC 112, second paragraph as being indefinite. The claims have been amended to overcome this ground of rejection.

Claims 1-4 stand rejected under 35 USC 102(b) as being anticipated by Grasselli et al (US Patent 5,374,410). This ground of rejection is respectfully traversed. The claims have been amended into a form believed to be patentable over Graselli et al. Claim 1 requires a proton type β zeolite. Claim 2 requires that the proton type β zeolite have a $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratio is within 20-70

Grasselli et al. does not teach the use of a proton type β zeolite and in particular, one with a $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratio is within 20-70, which is different from a ZSM type zeolite. Thus, the amended claim 1 is not anticipated by Grasselli et al.

Claims 1-2 stand rejected under 35 USC 102(b) as being anticipated by JP 2000-308831. This ground of rejection is respectfully traversed.

JP 2000-308831 does not disclose a proton type β zeolite, and in particular one having a $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratio of 20-70, but discloses a β zeolite having Si/Al ratio of 10-100. Further, JP2000-30881 discloses a catalyst on which a noble metal component such as platinum, palladium or the like is supported as a precondition. Since the catalyst in our claimed inventions is different from that taught by JP2000-308831, it is meaningless to compare the molar ratios with each other.

Claims 1-2 stand rejected under 35 USC 102(b) as being anticipated by Feeley et al (US Patent 5,776,423). This ground of rejection is respectfully traversed.

Feeley et al. discloses a catalyst on which Cu, Fe and Co are supported as a precondition. It is meaningless to compare the silica/alumina ratio in the catalyst of our claimed inventions comprising only a proton type β zeolite with the one taught by Feeley et al. Therefore, the amended claim 1 is not anticipated by Feeley et al.

Claims 3-4 stand rejected under 35 USC 103(a) as being unpatentable over JP 2000-308831 in view of Grasselli et al. This ground of rejection is respectfully traversed.

JP2000-30881 discloses a catalyst for the selective catalytic reduction of nitrogen oxides comparing a hydrogen form zeolite β having a Si/Al ratio of 10-100. However, in JP2000-30881, it is a necessary condition that the zeolite catalyst supports one or more than two kinds of the noble metal component selected from VIII and IB group of the periodic table, such as platinum, palladium, rhodium and the like, as the denitration catalytic activity noble metal component. On the contrary, the catalyst in our claimed inventions does not need to support such noble metal component and uses only a proton type β zeolite. Further, in JP2000-30881, natural gas as methane or the like is used as a reducing agent. However, in our claimed inventions, methanol and/or dimethyl ether are used specifically as a hydrocarbon including oxygen. Thus, our claimed inventions are entirely different from what is taught in JP2000-30881, with respect to the combination of catalyst and reducing agent.

As described in the above, Grasselli et al. does not disclose $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratio and JP2000-30881 uses a catalyst supporting noble metal component.

Methanol and methane are not functionally equivalent in the design of catalyst because methane burns completely only at considerable high temperature but Methanol burns easily completely at lower temperature.

Further, as apparent from Table 1 in our specification, Sample 7- β zeolite which supports Co (which is noble metal)-, Samples 10 and 11- β zeolite which uses propylene (which is a mate of methane as a reducing agent)- and Samples 6 and 9 using ZSM type

zeolite show lower NOx removal efficiency in comparison with embodiments of our inventions.


Thus, our claimed methods of reducing nitrogen oxides in which methanol is used as a reducing agent, together with only a proton type β zeolite are not obvious from the teachings of the JP reference and Grasselli et al.

If any additional fees are due in connection with the filing of this response, please charge the fees to Deposit Account No. 02-4300 under our charge order 034145.002. Any overpayment can be credited to Deposit Account No. 02-4300.

Respectfully submitted,

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